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AN ANALYSIS OF THE FOREST SITUATION IN THE GRAYS HARBOR AREA.



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P
PROGRAMS
Land Use
Grays Harbor Area

Portland, Oregon

April 1, 1944

(Field work and preliminary
draft completed in 1943)

AN ANALYSIS OF THE FOREST SITUATION
IN THE GRAYS HARBOR AREA
STATE OF WASHINGTON

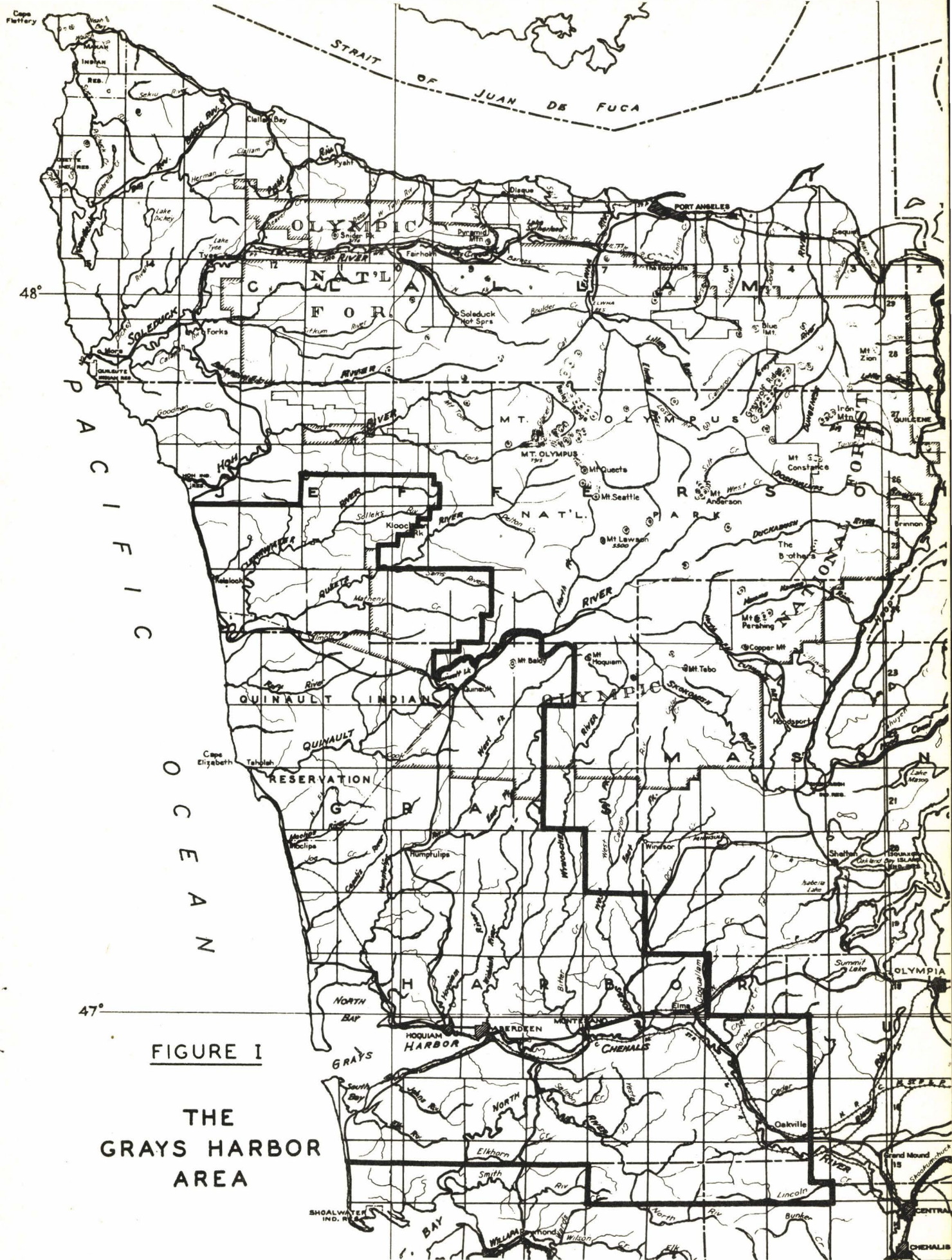
William E. Bates, Jr.
Division of State and Private Forestry
U. S. Department of Agriculture, Forest Service
North Pacific Region
Portland 8, Oregon

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THE GRAYS HARBOR AREA

FOREWORD

Although much has been written about the forest situation in Grays Harbor County, the final word is yet unsaid since we are dealing with a dynamic and complex situation. This analysis differs from others in that it attempts to deal specifically with the area tributary to the forest industries of Aberdeen and Hoquiam, which is called the Grays Harbor area for the purposes of this report.

This report should not be confused with "Forests and Forest Industries of the Grays Harbor Unit" by the Pacific Northwest Forest and Range Experiment Station. The latter deals with a unit of the Douglas-fir region which includes all of Pacific and Grays Harbor Counties, and the west half of Jefferson County, dealing less specifically with the forest problem as it affects the communities of Aberdeen and Hoquiam.

The Grays Harbor area embraces not only most of Grays Harbor County but also those portions of Jefferson, Lewis and Pacific Counties which now serve Grays Harbor forest industries. Geography, transportation facilities, land ownership, and log movements were fully considered in delineating the area (See Figure 1). The northern limit was fixed at the divide between the Hoh and Clearwater Rivers because there is no rail connection between the Hoh River drainage and Grays Harbor, and logs from that territory mostly move north. The area is bounded on the east by the Olympic National Park, by the lands of the Simpson Logging Company, and those portions of the Olympic National Forest which are a part of the Shelton Working Circle. Small portions of Lewis and Pacific Counties are included.

ACKNOWLEDGEMENT

The author is indebted to various lumbermen, timber owners, and the commercial organizations in the Grays Harbor area for their generous cooperation in making available data used in the preparation of this report. He also wishes to express his thanks to the members of the Division of State and Private Forestry, and those on the staff of the Pacific Northwest Forest and Range Experiment Station for their helpful review and comments.

SUMMARY

Location and Area (Data as of January 1, 1942)

1,395,699 acres in Grays Harbor County, western Jefferson County, and portions of western Lewis and northeastern Pacific Counties, adjacent to Grays Harbor County, State of Washington.

Ownership Pattern (Total Area)

Ownership	Area in Acres	%	Acres	
			Reserved	From Cutting
Private	824,368	60		
State	236,225	17	475	
County	12,820	1		
Indian	175,159	12		
National Forest	135,032	9	4,125	
Other Public	12,095	1	12,095	
Total Area	1,395,699	100	16,695	

Forest Data

Productive forest land 1,256,487 Acres, or 91% of total area

Old growth and merchantable second

growth 589,504 Acres

Immature timber area 449,253 "

Recent cutover and not stocked 217,730 "

Available timber volume 20,316 Million B.F.

Douglas-fir	2,026	Million B.F.	10%
Sitka spruce	1,256	" "	6%
Western hemlock	10,344	" "	51%
" redcedar	3,103	" "	15%
Pacific silver-fir	3,435	" "	17%
Other	152	" "	1%
	<u>20,316</u>	" "	<u>100%</u>

Timber volume by ownership 20,316 Million B.F.

Private	7,026	Million B.F.	34%
State	4,312	" "	21%
County	94	" "	1%
Indian	2,875	" "	14%
National Forest	6,009	" "	30%
	<u>20,316</u>		<u>100%</u>

Ownership Pattern (Productive Forest Area)

Ownership	% Based on Total Area	% Based on Merchantable Timber Volume
Private	59	34
State	17	21
County	1	1
Indian	12	14
National Forest	10	30
Other Public	1	
	100	100

Log Requirements and Allowable Cut

Average log requirements of sawmills, pulp mills, plywood and veneer plants for the five-year period 1937-41, inclusive, amounted to 611 Million B.F. per year. This represents 151 Million B.F. more than the estimated allowable annual cut of 460 Million B.F., or one-third greater than it should be in order to operate on a sustained yield basis. A portion of this deficit is being made up by importation of 56 Million B.F. from points outside the Grays Harbor area; however, these are somewhat offset by shipments of 41 Million B.F. of logs from Grays Harbor to Puget Sound points.

At the present rate of cutting of the different species, Douglas-fir will be cut out in about six years, hemlock and silver-fir in about 154 years, cedar in 26 years and spruce in 28 years.

Annual Growth

	<u>Million B.F.</u>
For trees 16" DBH and up	
Current annual growth	174
Potential " "	594
For trees 12" DBH and up	
Current annual growth	239
Potential " "	943

Hemlock comprises 83% of the current growth, Douglas-fir 8%, spruce 6%, cedar 3%. Hemlock is the only species growing faster than it is being cut.

Note. Current annual growth is the net growth which is taking place in the immature and second growth and mature timber at the present time; potential annual growth is that which could be attained provided the lands are fully stocked with an equal distribution of age classes from one year to the rotation age.

Status of Cut-over Lands

Fifty-three percent of the productive forest land has been cut over. The condition of the cut-over lands presents a rather serious obstacle to sustained yield forestry. Of the 666,983 acres of cut-over lands, 32% supports no tree growth, 14% is poorly stocked, 31% is fair, and 23% well stocked. The current annual growth of all cut-over lands is 56.6 million board feet, whereas, the potential annual growth is 333 million. The reasons for the widespread discrepancy between the current and potential growth are twofold. First, much of the area is idle, and, secondly, where satisfactory young growth is established, the timber is so small that growth cannot be measured in terms of utilizable board feet of lumber. There is a very uneven distribution of age classes, the major portion being under 30 years of age. If the distribution of age classes were balanced the current and potential growth for that portion satisfactorily stocked would be approximately equal.

Fire Losses

Destructive fires following logging and subsequent reburns have caused a large acreage of nonstocked lands. Acreage burned was at the rate of 11,092 acres each year for the past five years. About 60% of this was reburn resulting in destruction of natural reproduction and the possibilities thereof. The potential annual growth for the 217,730 acres of nonstocked lands is 108 million feet or a volume slightly more than one-sixth of the average annual volume consumed by the forest industries of Grays Harbor during the past five years.

Importance of Forest Industries to Community

The forest industries are the principal support of the communities of Grays Harbor. Forty-two percent of all wage earners in Grays Harbor County find employment in the forest industries. Among the primary industries, or those which create a surplus of products marketable outside the county, the forest industries account for 74% of those gainfully employed. Forty percent of the total amount collected in taxes by Grays Harbor County is paid by the forest industries.

Prospect for Sustained Industrial Forestry

Excellent deep water transportation, favorable climate and topography, good timber growing sites, a substantial volume of old growth, and an unexcelled rate of forest growth all add up to make the Grays Harbor area one of the outstanding localities in this country for the practice of forestry.

Throughout a long period large scale operations have been conducted without special regard to forest management principles. The resulting situation is characterized by an installed capacity in excess of the productive capacity of the tributary land; by an industry geared to the production of Douglas-fir which is now nearing exhaustion; by extensive areas of idle or poorly stocked burns or cutovers; uneven distribution of age classes; a complex pattern of ownership.

Formidable as are these obstacles they are offset by credit items. There still remains an opportunity, although it diminishes with each year of procrastination, to convert from an unmanaged to a managed basis of operations, and to realize sustained production and community stability at a level substantially equal to the present.

A sustained forest economy is possible for the Grays Harbor area. This goal may be attained through a very real spirit of cooperation among all interested parties, and by:

1. A reduction in the log requirements by the mills in the Grays Harbor area to conform to the allowable cut, and an expansion of remanufacturing and specialty production of wood products, whereby no serious loss in labor or income would occur;
2. Remodeling of old and outmoded plants and the introduction of machinery adapted to the smaller log sizes;
3. Closer utilization in the woods by taking out small logs, sound slabs and chunks, and less destruction to small trees left standing which could be logged in subsequent operations and also useful as a source of seed;
4. By cutting selectively not more than about 35% of the stand wherever practicable, thus leaving the thriftier trees and the smaller understory and lower value trees for future cuts, and avoiding the tremendous waste of material incident to clearcutting operations as presently conducted;
5. The formation of cooperative sustained yield units whereby the various classes of ownership within the unit can be pooled for management purposes, thus assuring continued industrial activity. The Forest Service, Indian Service and the State are now authorized to enter into cooperative agreements with private owners when in the public interest.
6. A reduction of the area burned annually, through:
 - a. Prompt and aggressive action on all classes of fires by the individual or agency responsible for suppression;
 - b. Maintaining crews during the fire season at strategic locations for prompt action and to provide for adequate mop up and patrol;
 - c. More aggressive action on early spring and late fall fires;
 - d. A closer integration of man power and equipment, and a better coordination of effort on the part of all forest protection agencies;

- e. More thorough planning so that the most efficient use of time, men and equipment can be made;
 - f. The entry of the county into the fire protection picture through an agreement with an organized protection agency for the protection of county lands;
 - g. A reduction of the number of man-caused fires through education, more intensive patrol and inspection, and the apprehension and prosecution of those responsible for fires through carelessness or deliberate act;
 - h. Additional funds for fire protection purposes;
 - i. More consideration given to closures during the hazardous periods.
- 7. Planting on poorly and nonstocked areas.
 - 8. Consolidation and exchanges of ownerships for more efficient management by the various owners.
 - 9. Formulation of a county land policy and provision for professional administration of county owned forest lands.
 - 10. Formation and expansion of tree farms.
 - 11. An educational campaign in forest practices throughout the Grays Harbor area so that proper appreciation may be had by the general public regarding this important resource and of its relationship to the welfare of the various communities within the area.

THE FOREST SITUATION

Development of Wood-using Industries

Since the establishment of the first sawmill in 1881, approximately 30 billion board feet of lumber have been cut at Grays Harbor. The production peak was reached in 1926 when 1,557,223,000 board feet of lumber were produced. During the six-year period 1924 to 1929 the average annual cut was 1,352,788,000 board feet. The volume fell off sharply with the depression and the billion foot mark has not been reached since 1929.

Today the 11 large sawmills, the 3 plywood plants, the veneer mill and the pulp and paper mill as well as the many small lumber and shingle mills consume approximately 611 million board feet of logs annually. This figure is the average for the years 1937 to 1941 inclusive.

Grays Harbor County at one time possessed the finest stands of Douglas-fir and Sitka spruce in the Northwest. They were exceptional in quality and the trees were of large size. Most of the mills now in operation were built between 1884 and 1923 and were designed to handle this large material. The timber situation has changed perceptibly since the mills first came into production. The seemingly unlimited stands of large old growth Douglas-fir will soon be exhausted. Thereafter, some 20 billion feet of other species such as western hemlock and silver fir must be depended upon for a continuation of the forest industries. To effect the changes in manufacturing and merchandising necessary to continue in operation on this new resource base presents a direct challenge to forest industries.

The Forest Situation in the Area Today

The Grays Harbor area continues to be one of the dominant producers of lumber in the Northwest. In 1941 the volume of lumber cut amounted to 13½% of the total produced in western Washington.

Table I. Volume of Logs Cut by Grays Harbor Forest Industries
Spaulding Rule - Volume in M.Ft.B. M.

Species	Year						%
	1937	1938	1939	1940	1941	Average	
Douglas-fir	458,864	157,016	250,704	408,481	473,944	349,802	57
Spruce	47,762	50,159	68,762	82,904	83,790	66,675	11
Hemlock	77,661	61,889	86,765	103,959	106,260	87,307	14
Cedar	93,957	103,877	115,771	112,727	104,133	106,093	17
Misc.	332	3,537	1,667	330	2,114	1,596	1
Totals	678,576	376,478	523,669	708,401	770,241	611,473	100
No. of Mills	38	35	38	42	49	40	

Fifty-seven percent of the total is Douglas-fir, and practically all of this is consumed by the large sawmills and plywood plants of the Harbor area. The pulp and paper plant is the principal user of hemlock. Very little hemlock is cut by the sawmills. Next in importance to Douglas-fir is cedar. Two cedar mills account for a sizable volume but by far the larger part of the total is converted into shingles. A small volume of spruce is used in the paper industry. Its principal use is in specialty items. At the present time a large proportion of the spruce output is consumed by the aircraft industry and other war demands. This, an emergency war use, is not likely to be sustained at its present level when the war ends.

The Number of People Employed

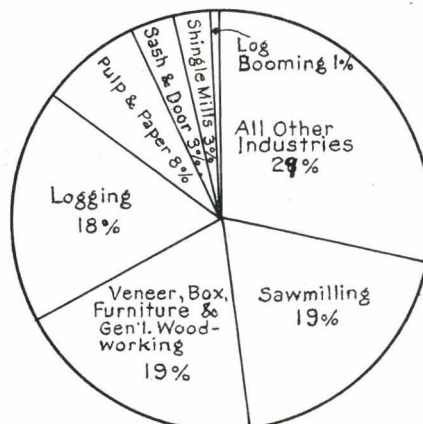
In 1940 there were 7,703 people employed in the forest products industries. This represents approximately 42% of the total wage earners, or 74% of those employed in the primary industries in Grays Harbor County. The primary industries are those which create marketable surpluses and a balance of trade in favor of Grays Harbor. Without them the number of wage earners in the other supporting occupations would be sharply reduced, in fact many of the service type occupations would not exist. Therefore, the figure of 74% may be regarded as the degree to which the communities of Aberdeen and Hoquiam are dependent on forestry and its allied industries. This figure is conservative since forest products industry and labor make greater demands on the service trades than agriculture or any other primary industry.

Figure II shows the proportion of wage earners in the primary industries. Grays Harbor is heavily dependent upon the forest products industries and its continued stability at present levels depends on sustaining them.

Payroll of the Forest Industries

Information obtained from the Department of Labor and Industries at Olympia for the month of October 1942 shows that 71% of the industrial payroll and 70% of the industrial workman hours are expended in the forest industries. The following chart shows the payroll segregated into its component industries. From these data it can be seen that the future prosperity of Grays Harbor will vary in direct proportion with industrial payrolls and man-hours of employment in the forest products industries.

CHART I
Distribution of Payrolls -
Grays Harbor County - Oct. 1942



Total Payroll \$1,893,822

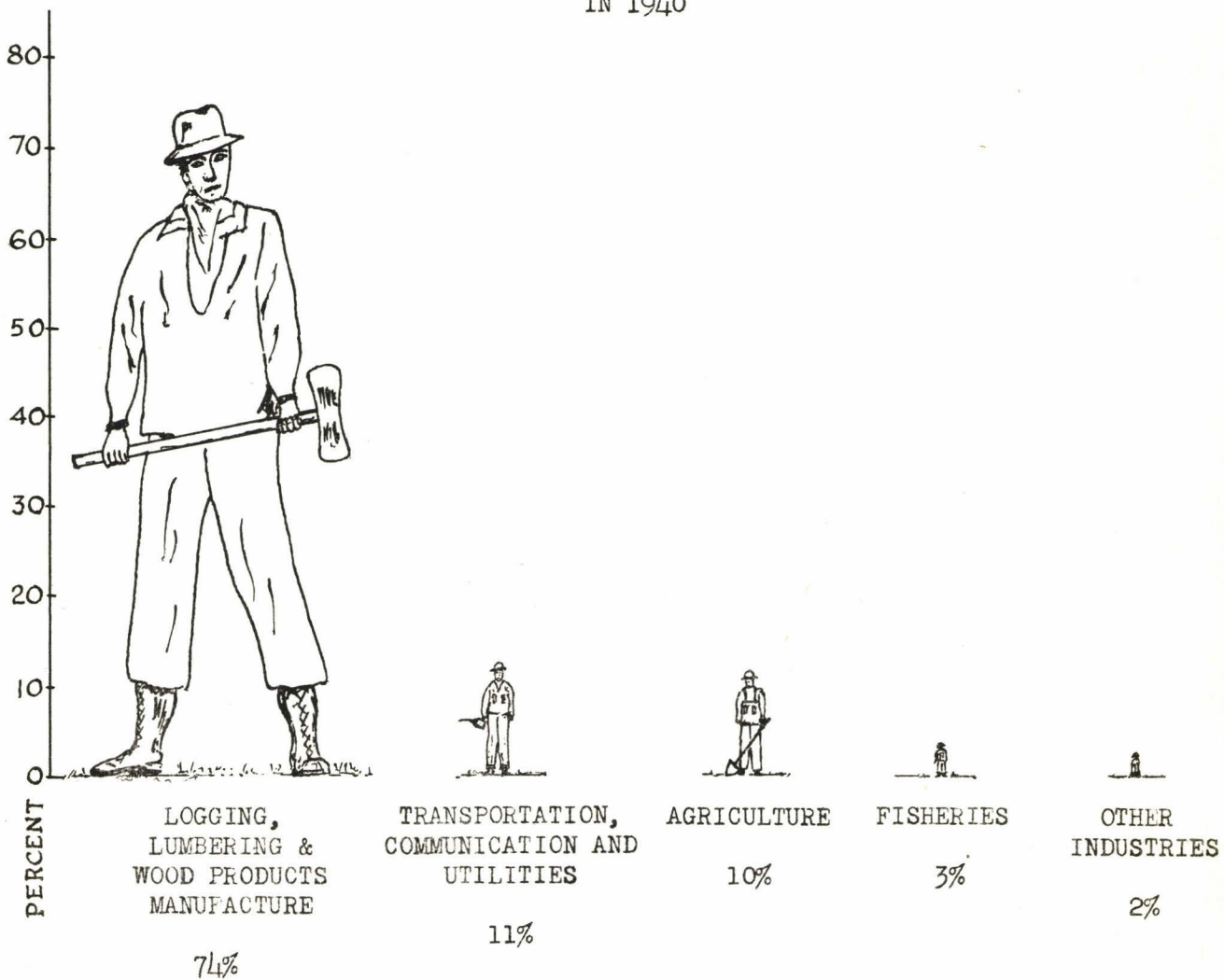
Figure II

THE PRIMARY INDUSTRIES IN
GRAYS HARBOR COUNTY

AND

PROPORTION OF POPULATION
SUPPORTED BY EACH

IN 1940



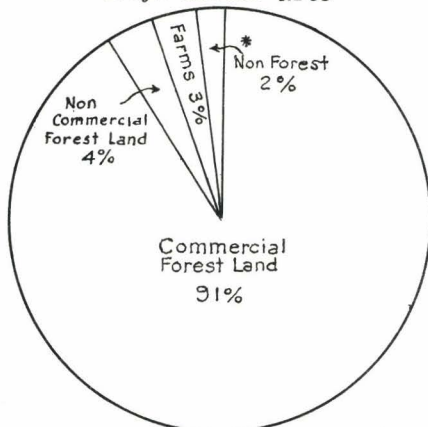
Tax Revenue from Timber, Timberland, and Logging and Lumbering Improvements

Forty percent of the total taxes collected by Grays Harbor County in 1941 was paid by the forest products industries. Of a total assessed valuation of \$20,922,486 the forest industries' share was \$8,362,075. This again indicates the importance of a sustained forest economy to the local communities as well as the county. If the forest products industries should be greatly curtailed, the local governments would be hard pressed to obtain funds to provide the services required by the people living in the county. The tax base can be stabilized by keeping the forest areas fully productive.

The Forest Resources

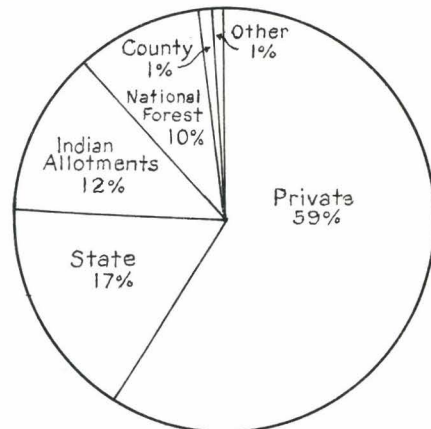
Approximately 91% of the total acreage consists of lands suited to the growing of timber crops. Of this, 75% lies in Grays Harbor County, 21% in Jefferson, and 4% in Pacific and Lewis Counties. Charts II and III below give a graphic picture of the forest land status in the area.

CHART II
Acreage of Timber Lands-
Grays Harbor Area



Total Acreage 1,395,699

CHART III
Acreage Distribution by Ownership



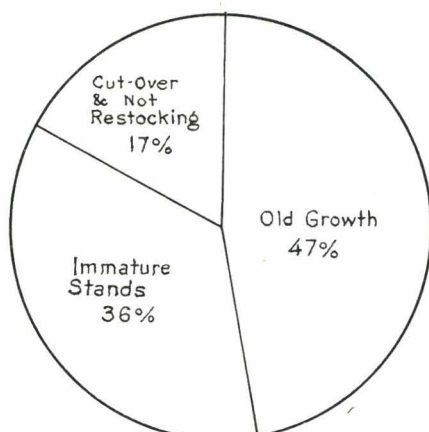
Total Acreage 1,395,699

Commercial forest land consists of areas supporting timber of commercial importance which can be economically logged, and cut-over lands which have not been converted to agricultural use. Noncommercial lands consist of noncommercial timber types such as lodgepole pine, alpine fir and mountain hemlock and forest lands containing the more valued species but on rocky, precipitous slopes that would preclude utilization. This latter class also includes commercially important timberlands that have been reserved from cutting.

*Non-forest includes urban, tide waterflats, rock barrens above timberline, brush fields, etc.

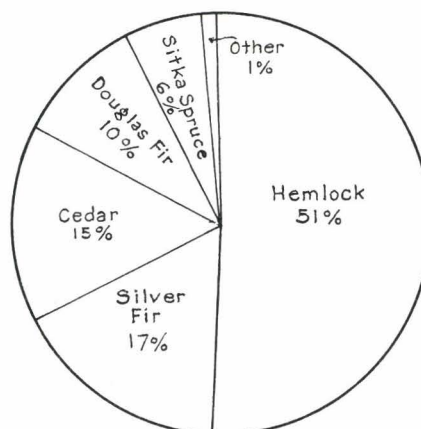
No attempt is made in this report to deal with the possibilities of agricultural expansion. It should be understood that the classification "commercial forest lands" does not necessarily preclude farming but only implies that the soils are well suited to growing forest crops. Chart IV below shows that after 60 years of lumbering 47% of the area of commercial forest land is still in old growth stands. But attention is directed to Chart V which shows that the composition of the remaining old growth runs 90% to species other than Douglas-fir. This is significant in view of the production statistics previously cited which show that Douglas-fir represents nearly 60% of the annual cut.

CHART IV
Forest Lands
of Commercial Importance



Total Acreage 1,256,487

CHART V
Timber Volume by Species



Total Volume 20,316,593,000 Bd. Ft.
Scribner Rule

At the present rate of cutting (based on the period 1937-41, inclusive) the remaining Douglas-fir will last about six years, although actually this period will be prolonged somewhat by the importation of this species from outside points. Hemlock and silver fir if cut at present rates would last 15 $\frac{1}{2}$ years. The need and desirability of developing markets and converting to the utilization of other species is thus apparent.

Chart III has been placed next to Chart VI. These show the relationship of timber area and volume to land ownership. The significant fact is that whereas private ownership accounts for 59% of the total land area, it controls only 34% of the remaining sawtimber volume.

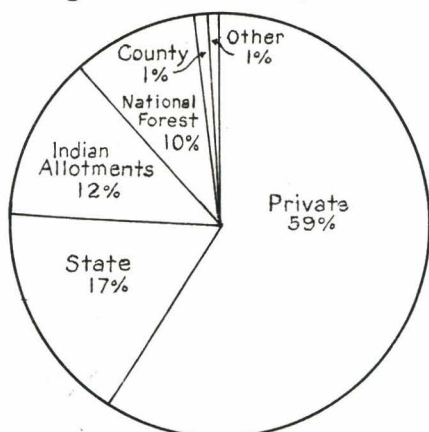
The Forest Balance Sheet

Attention is directed to Figure III which shows a comparison between growth and drain in the Grays Harbor area.

The estimated current annual growth of 174 million board feet represents the board foot increment now taking place each year on all classes of forest land within the study area. By comparison with potential annual growth and with present drain it is a disappointingly low figure. This low growth is accounted for by the fact that 17% of the forest area is non-restocked cutover land producing no growth at all. Forty-seven percent still supports mature timber and merchantable second-growth which is producing only a fraction of the possible increment, because the growth in this timber is offset to an appreciable degree by decay and mortality in the old-growth stands. The remaining 36% of the forest area is in fairly good condition; however there too, the present growth is relatively low because much of the young timber is still too small to be measured in board feet.

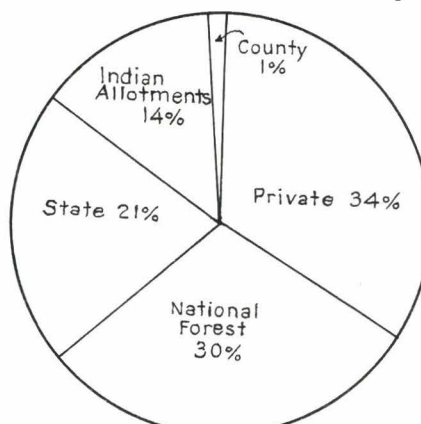
There is a potential or possible annual growth of 594 million board feet based on growth rates for the Douglas-fir type, which are considered very conservative for this area. It is as great or greater than the potential growth of any area of equal size in the United States. It is a bright prospect and worthy of the most careful planning and diligent effort to achieve.

CHART III
Acreage Distribution by Ownership



Total Acreage 1,395,699

CHART VI
Timber Volume by Ownership



Total Volume - 20,316,593,000 Bd. Ft.
Scribner Rule

The bulk of the remaining sawtimber is in public and Indian allotment ownership. Table III of the Appendix shows the remaining sawtimber volume by the different ownerships. In considering this tabulation, which is compiled as of January 1, 1942, one must bear in mind that the volume now available is about $1\frac{1}{2}$ billion board feet less than the total figure indicated. This reduction is the amount by which the stands have been depleted during 1942 and 1943.

The Forest Balance Sheet

Attention is directed to Figure III which shows a comparison between growth and drain in the Grays Harbor area.

The estimated current annual growth of 17 $\frac{1}{4}$ million board feet represents the board foot increment now taking place each year on all classes of forest land within the study area. By comparison with potential growth and with present drain, it is a disappointingly low figure. It is accounted for by the fact that 47% of the forest area still supports old growth timber in which because of overmaturity and mortality there is relatively little net growth. Another 17% of the area is classed as non-restocked cutovers and is therefore idle. The remaining 36% of the forest area is in fairly good condition and accounts for about one-third of all of the current annual growth. Were it not for poor stocking on parts of this area and the fact that so much of the reproduction is still too small to be measured in board feet, the current annual growth would be larger.

The potential annual growth of 59 $\frac{1}{4}$ million board feet represents the volume which could be grown if every acre were fully productive. It represents a growth which is conservative for the Grays Harbor area but more than could be reasonably expected from most any other area of equal size in the United States. It is a bright prospect and worthy of the most careful planning and diligent effort to achieve.

OFFICE OF State and Private Forestry

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PORTLAND, OREGON

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MEMORANDUM FOR Mr. Cowlin , Experiment Station

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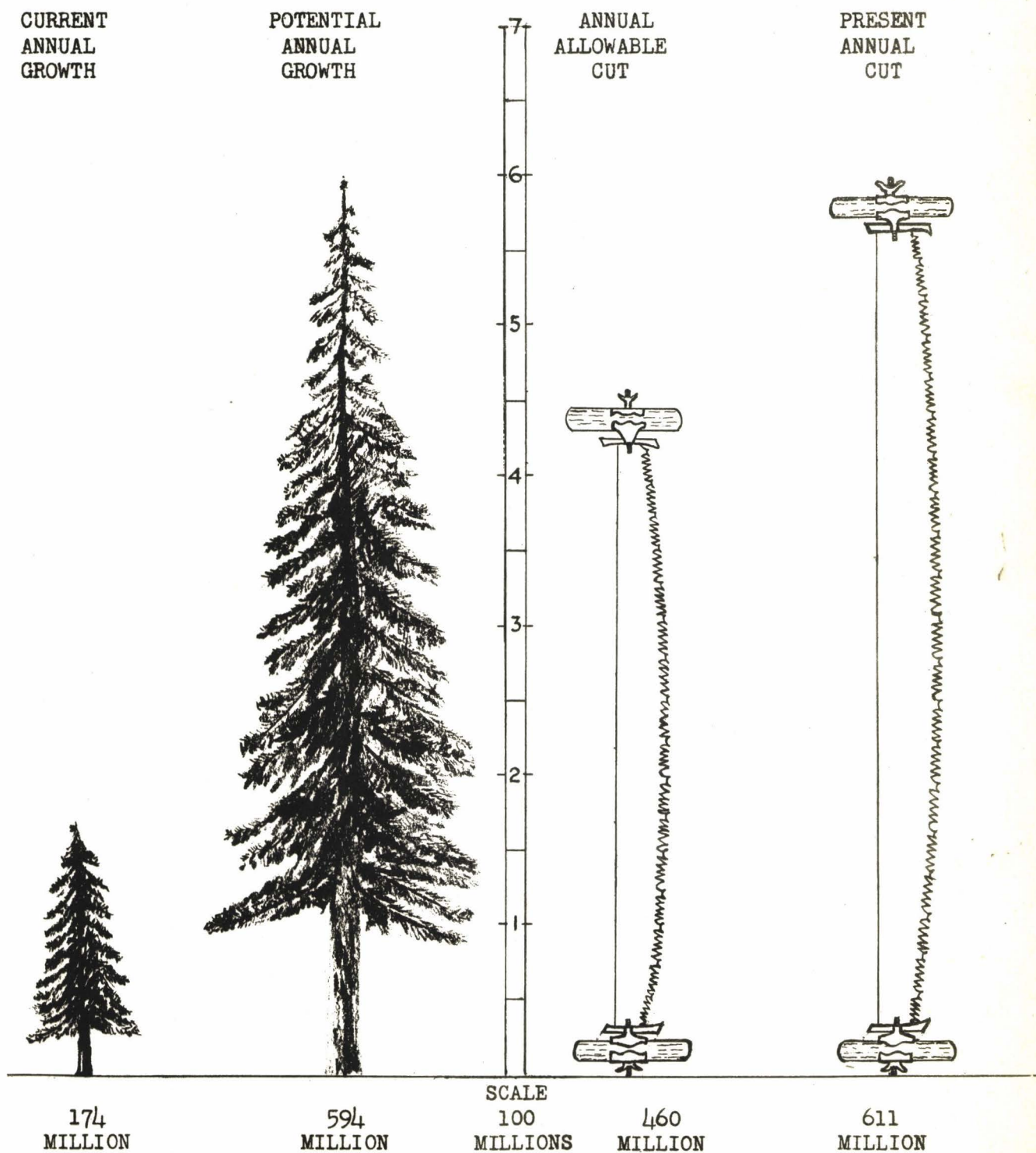
Attached is the correction for page 5 of the Grays Harbor Area report by Mr. Bates.

Did you also note the correction in the 2nd line of paragraph 4, page 7 the figure 500 has been changed to 475.

Figure III

THE FOREST BALANCE SHEET

For Trees 16" d.b.h. and up.



SCRIBNER LOG SCALE

The present annual drain of 611 million board feet is $3\frac{1}{2}$ times the present annual growth. It is even in excess of the potential annual growth. But the adjustment necessary to get on a sustained yield basis of operation is not so drastic as indicated by the current annual growth--drain comparison. The allowable annual cut under sustained yield is estimated in Figure III at 460 million board feet. If cutting were reduced and maintained at approximately this level, the old growth timber would last about 44 years. During this time sufficient of the second growth would attain merchantable size to continue operations. And as more and more cutovers are converted to a productive condition, the allowable annual cut could be gradually increased to approach the potential annual growth of the area.

It is thus apparent that a reduction of about one-third in the annual cut is the first step in converting to a sustained-yield basis of operations. This curtailment will not be easy, but except for the considerable volume of uncut timber the curtailment would need to be larger. The longer an excessive cut continues, the more difficult the adjustment to sustained yield will become. Eventually the possibilities vanish and old growth depletion followed by a long period of inactivity is the only prospect.

The following table contrasts the present (Col. 3) with the allowable annual cut (Col. 5) by species,

Present vs. Allowable Annual Cut						
Species	; Total ; Actual		No. of Yrs.: Approx. Ann.		Excess of Actual	
	Volume:	Cut	Cutting	Allowable Cut:	Over Allowable	
	Million:	Million:	at Present:	Million	Annual Cut	
	Bd. Ft.:	Bd. Ft.:	Rate	Bd. Ft.	in Percent	
(1)	(2)	(3)	(4)	(5)	(6)	
Douglas-fir	2,026:	350	6	100		+250
Hemlock and silver-fir	13,778:	89	154	315		- 71
Cedar	3,103:	106	26	30		+253
Spruce	1,256:	66	28	15		+340
Misc.	152:					
Totals	20,315:	611	33 Ave.	460		+ 33

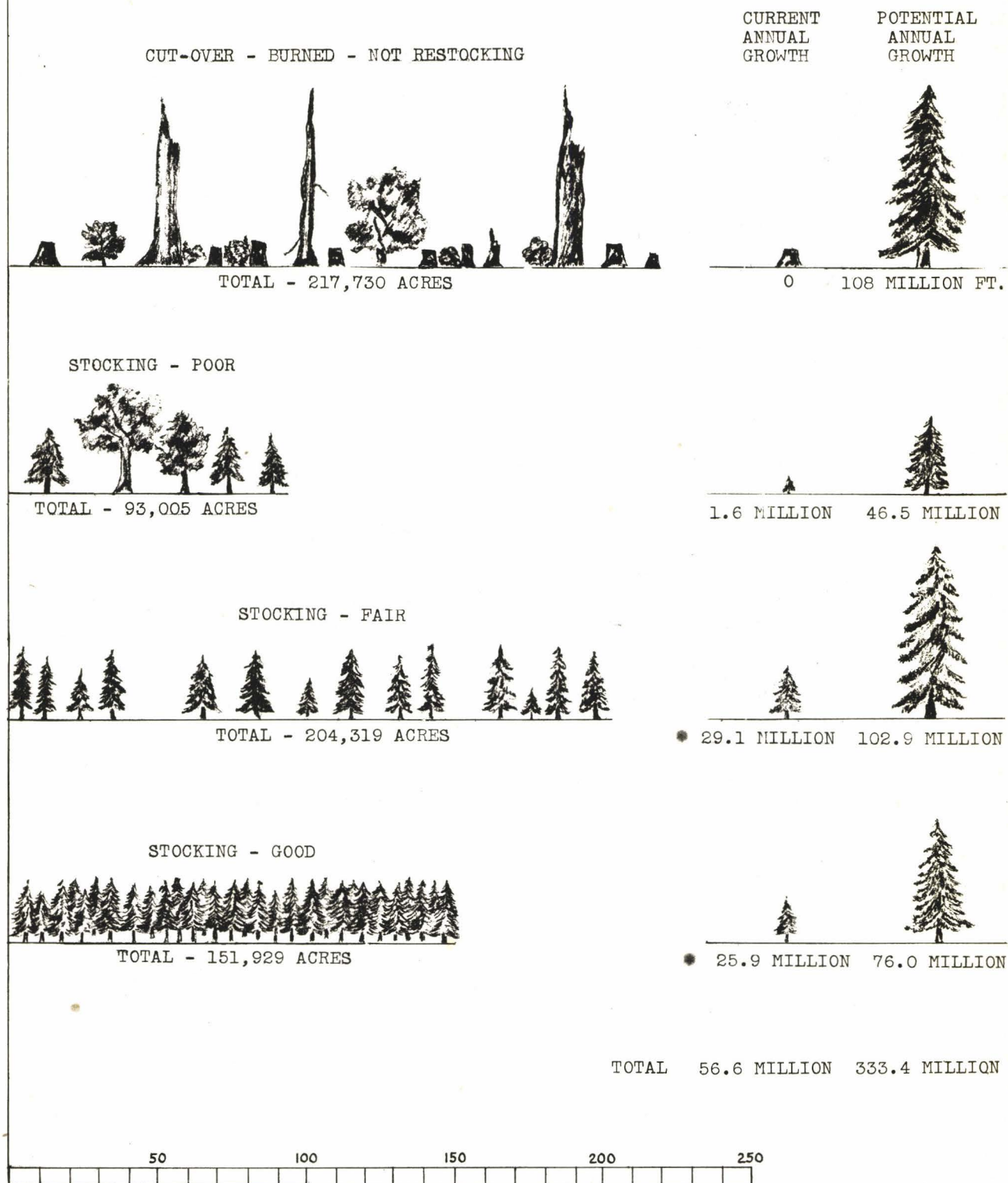
More significant than the need to effect an overall reduction of one-third in the annual cut, is the need to bring about a radical change in species utilization. Douglas-fir, cedar and spruce are being drastically overcut while hemlock and silver-fir are being utilized at a rate far below the maximum allowable under good forest practice. These species must enter the picture either as substitutes for the fast disappearing Douglas-fir or as raw material for other forest industries that are not dependent on Douglas-fir

Growth

Figure IV shows the relationship of the current annual growth to the potential annual growth for the cut-over lands by various degrees of stocking. The following tabulation shows the acreage, current growth and potential growth by these grades of stocking.

Figure IV

GROWTH ON PRESENT CUT-OVER LANDS
For Trees 16" d.b.h. and up.



ACRES - IN THOUSANDS

TOTAL - 666,983 ACRES

*Note: The factors of age and age-class acreage have an important bearing on the current annual growth.

Comparison of the Current and Potential Growths

Degree of Stocking	Area in		Total Current	Total Potential
	Acres	%	Growth Million B.F.	Growth Million B.F.
None	217,730	32	0	108
Poor	93,005	14	1.6	46.5
Fair	204,319	31	29.1	102.9
Good	151,929	23	25.9	76.0
Totals	666,983	100	56.6	333.4

The current growth is 17% of the potential annual growth for lands that have been cut over thus far.

The principal reasons for this low current rate of growth are due to various factors, such as a low degree of stocking on a large part of the area, an unequal distribution of age classes (See Figure V), and a large proportion of the area in the younger age classes. This latter condition results in a large cubic foot growth but since the trees are under 16" in diameter they have no board foot content and therefore no growth can be indicated for them on this basis.

Attention is directed to the comparison between current and potential annual growth on "fair" and "good" stocked areas. In each instance current annual growth is approximately one-third of the potential. Ordinarily, the current annual growth on "good" stocked lands would be expected to bear a higher ratio. This apparent discrepancy is accounted for by disproportionate distribution of age class acreages within the two categories of restocking lands.

Potential annual growth as used in this report assumes a uniform distribution of age classes, and with such a distribution a sustained increment of ~~500~~ 475 board feet should be realized. Therefore, in order to approach a potential cut as indicated (594 million board feet) a uniform distribution of age classes must be considered a prime objective.

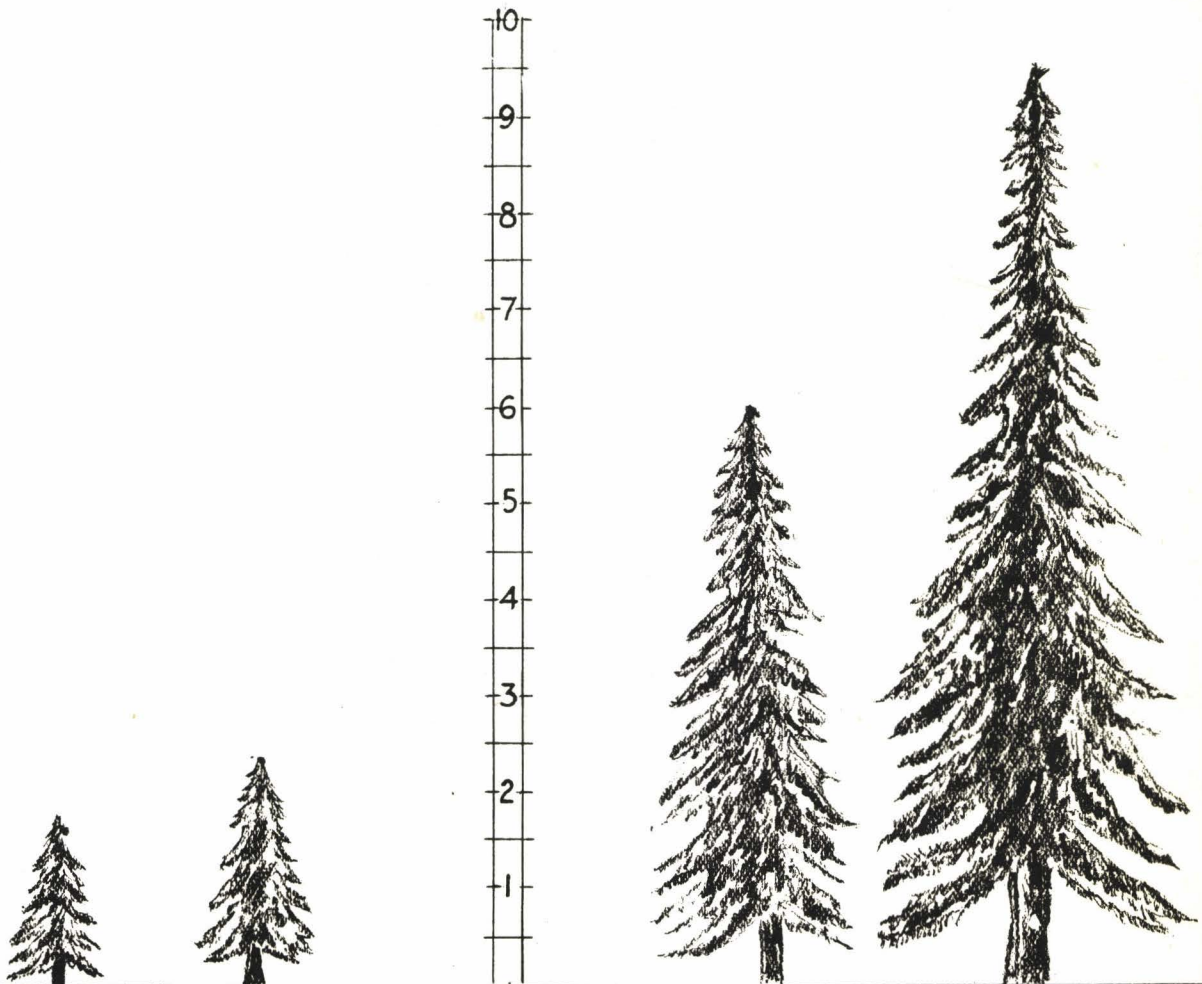
In Figure VI is shown the current annual growth in contrast to the potential annual growth that should be realized when the area is fully productive. A new factor appears, that being degree of utilization.

In the discussion thus far, growth has been expressed in terms of present utilization standards, namely, utilization of 32-foot logs to a 12" top in trees down to 16" DBH. Growth as shown under intensive utilization assumes utilization of 16-foot logs to an 8" top in trees down to 12" DBH. Volumes in terms of intensive utilization are not used throughout this analysis. To do so would not be in keeping with present practices and would present an over optimistic picture. It should be borne in mind that realization of potential annual growth is conditioned upon the attainment of full stocking with a normal distribution of age classes. These requirements can only be met with the passage of time and the application of intensive forestry measures.

Figure VI
FOREST GROWTH

CURRENT ANNUAL GROWTH

POTENTIAL ANNUAL GROWTH



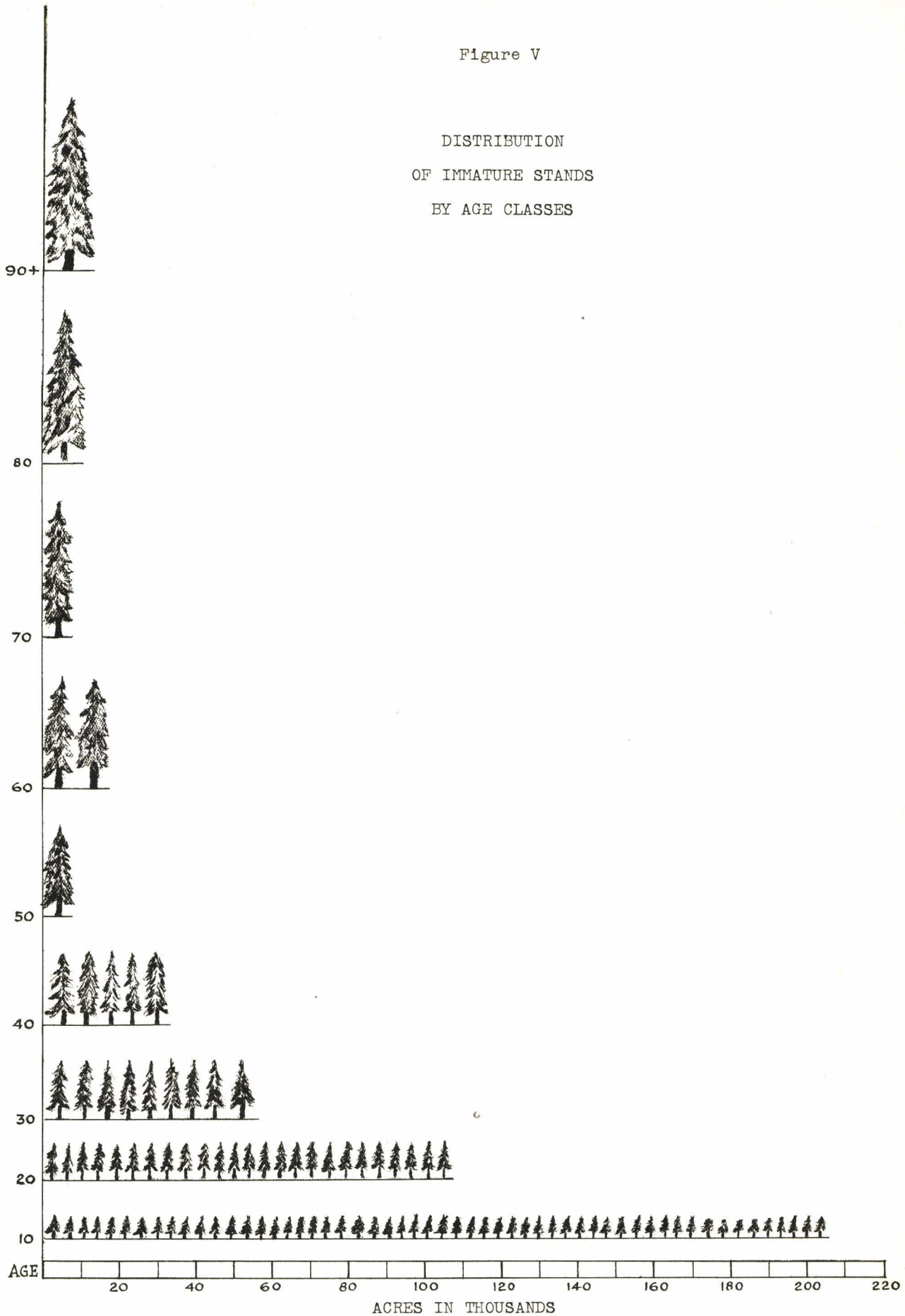
174 MILLION B.M. 239 MILLION B.M.
PRESENT INTENSIVE
UTILIZATION UTILIZATION

SCALE
100 MILLION
BD. FT.

594 MILLION B.M. 943 MILLION B.M.
PRESENT INTENSIVE
UTILIZATION UTILIZATION

Figure V

DISTRIBUTION
OF IMMATURE STANDS
BY AGE CLASSES



Fire Losses

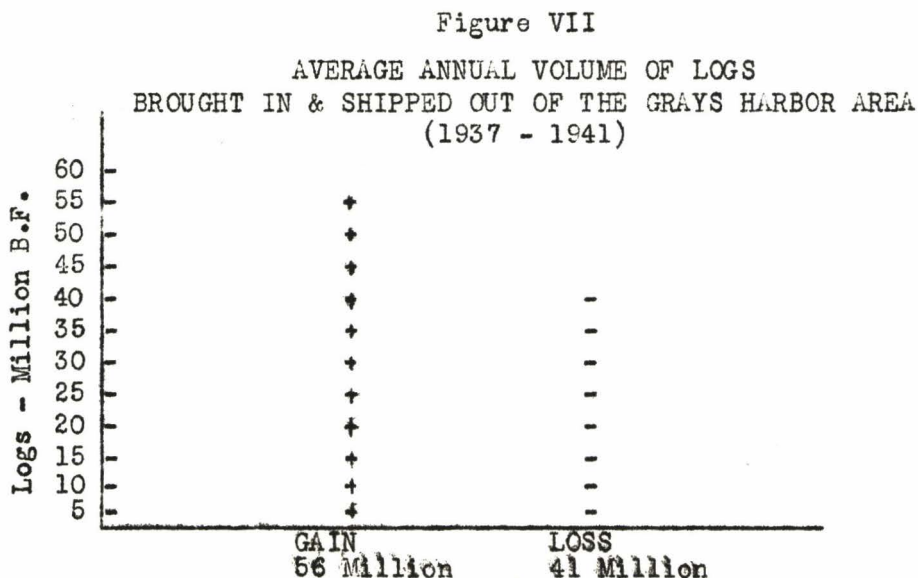
Fire has played a major role in accounting for the 217,000 acres of lands classed as non-restocking. During the five-year period 1937 to 1941, a total of 55,458 acres were burned over. An analysis of fire data available for a part of the Grays Harbor area reveals that approximately 60% of the acreage of current fires are actually reburns. If the same ratio applies to the area as a whole, then 33,275 acres of the area burned over during the five-year period can be classed as reburns; leaving approximately 22,183 acres burned over for the first time. From a forestry standpoint the danger lies in the acreage of reburns to a larger extent than in newly burned areas. When an area is reburned one or more times, there is little likelihood that natural regeneration will follow within a reasonable period of time. This is not always the case in areas burned over but once, such as areas of newly created slash.

Restocked, and under proper management, the 217,730 acres of idle lands are capable of sustaining a cut of approximately 108 million feet per year, or a volume slightly more than one-sixth of the average annual cut by the Grays Harbor mills for the past five years. Instead, because of the damaging effects of fires, particularly reburns, this large acreage is creating no wealth. A large part of the total acreage of nonproductive lands is either tax delinquent or has already reverted to county ownership.

Other Timber Losses

An average of approximately 41 million board feet of logs is shipped out of Grays Harbor each year. All sawlogs leaving the area represent 7.66 man hours of employment per M feet, whereas, if they were processed and remanufactured locally, the total man hours of employment would be between 13.39 for lumber and up to 65.0 for other wood products, depending on the degree of processing the logs received.

Forty-one million board feet annually would support one large sawmill and a payroll of from 125 to 150 men. As shown in Figure VII there are considerable log imports but from the standpoint of Grays Harbor all logs exported represent a payroll loss as well as a drain on merchantable timber of which there is already too little to sustain industry while second growth attains merchantable size.



Transportation Facilities

The area is traversed by a network of primary and secondary roads which adequately serve the area. Railroad transportation north of Grays Harbor is provided by a logging railroad which is not a common carrier, although it does haul a considerable amount of timber cut by other operators. It does not extend far enough to the north to tap all of the timber reserves of the area. Consequently, some of this timber now goes north to the Puget Sound mills and results in a loss to Grays Harbor. Aberdeen and Hoquiam are well served by three railroads, the Union Pacific, Northern Pacific, and the Chicago, Milwaukee, St. Paul and Pacific.

Water transportation has always been and undoubtedly will continue to be the principal means of shipping lumber and wood products to eastern markets.

Financial Aspects of Forestry Practice

Laboratory research is rapidly unfolding a vast range of new and improved uses of wood, and application of this knowledge is fast moving forward. In the future the matter of wood production may be simplified by the fact that cellulose and lignin may be derived, regardless of species, and the faster growing kinds, now sometimes considered as weed trees, may be given preference. However, as a matter of fact, over most of the Grays Harbor area, as in the greater portion of the United States, the choice of species to be grown will be left largely to Nature in the way of natural regeneration following cutting operations and fires. However, a choice of species may be aided to some extent by the method of cutting whereby either the more tolerant species such as western hemlock and silver fir may be favored by tree selection cutting, or the intolerant Douglas-fir and the moderately tolerant Sitka spruce favored by clear cutting or by area selection in small units. Hemlock regeneration is possible either under tree selection or clear cutting methods.

In recent years progressive lumbermen have seen the significance and value of timber as a crop. They have established tree farms and are investing substantial funds to protect and restore the productivity of cut-over lands. In the Grays Harbor area a combination of factors (such as excellent deep water transportation, favorable climatic conditions, gentle topography, and good soils producing unexcelled forest growth) makes this area one of the outstanding localities in this country for permanent industrial forestry.

The rate earned by capital investments in timberlands under three different methods of taxation has been analyzed. These analyses appear in the appendix to this report (See Pages A-6 to A-11). Certain assumptions have been made and these are common to each of the three cases analyzed. They are:

1. That the forest lands are on the average classed as Site II.
2. That the lands are or will be well stocked.
3. That when well stocked the yields will average 75% of those listed in published yield tables for similar lands.

4. That the crop will be harvested by clear cutting, rather than periodically in installments. This last assumption simplifies the calculations and will give the minimum rate earned. If partial cuts are made to remove merchantable trees which will later be crowded out of the stand, the growth rate of the remaining trees will be improved. The rate earned will also be greater under these latter conditions.
5. That taxes are computed at the rate of 2.73¢ per dollar of assessed valuation; fire protection costs 4¢ per acre and administration costs 2¢ per acre.

The three tax alternatives are;

- Case 1. Cut-over lands being taxed at the current rate of \$1.35 per acre assessed valuation and young growth being tax free. This is the present method of taxing restocked cut-over lands.
- Case 2. Cut-over lands being taxed at the current rate but young growth assessed at 25¢ per M at 45 years; 50¢ per M at 65 years and 75¢ per M at 85 years. This is an assumption based on the expectation that when young stands reach merchantable size some such readjustment will be made in order to provide tax revenue.
- Case 3. Cut-over lands are listed as reforestation lands and are assessed at \$1.00 per acre. A 12½% yield tax is collected at the time timber is harvested. This is in line with the provisions of the Washington State reforestation law.

In each case the rate earned by a capital investment not exceeding \$3.00 per acre for cut-over lands is very attractive. The rate varies with the amount paid for stumpage at the time of cutting. If the timber is held for not more than 60 years there is not much difference in returns on the investment between the three cases analyzed. If carried longer than 60 years a comparison between Tables VI, VII and VIII of the appendix shows that there is a decided advantage in listing lands under the Reforestation Act. Owners should give serious consideration to the listing of lands under this Act as the risk of tax burden is removed and if need be the timber can be carried into longer rotations to take advantage of increased stumpage prices paid for larger timber of higher quality.

It must be fully recognized that the earnings shown in the appendix will be realized only if the conditions previously stated prevail. Any increases in the tax rate, fire protection costs, and administrative costs will be reflected in a lower rate earned. The investment in non-restocked lands cannot yield a satisfactory rate of interest even if such lands are listed as reforestation lands. The following tabulation shows the effect of carrying cut-over and burned-over lands 15 and 25 years before they become satisfactorily stocked.

Tabulation Showing Effect of Delayed Stocking
on Investments in Cut-over Lands

Rate of Interest Earned by Reforestation Lands Assessed at \$1 Per Acre Cost of Land \$1 Per Acre; Stumpage \$1 Per M.B.M.				
Age of Stand:	Lands Satisfactorily Stocked at Time of Purchase	:	Lands on Which Stocking Has Been Delayed	:
			15 Years	25 Years
			Rate Earned, Percent	
40	2.6	:	-1.6	-2.9
50	4.8	:	1.7	-1.9
60	5.1	:	3.2	0.6
70	4.8	:	3.1	0.1
80	4.4	:	2.7	-1.5
90	3.8	:	1.5	-2.6
100	3.3	:	-1.8	-3.3

From the above it can be seen that idle lands are a burden to the timber landowner. It explains why idle lands are frequently tax delinquent, and why 108,000 acres are now owned by Grays Harbor County. Fires have been the principal cause of this condition.

Feasibility of Planting Non-restocking Lands on a Commercial Scale

When idle cut-over lands are planted the initial cost is about \$10 to \$12 per acre. By the time the timber is large enough to be harvested the total investment will have increased to about \$1.85 per M, providing taxes, fire protection and administrative costs are held to a total of 10¢ per acre per year, and provided that the planting was successful. If considerable development work is required, the cost per M will be increased proportionally. An investment of \$1.85 for every thousand feet of timber grown does not appear to be a very attractive proposition since a stumpage price of between \$2.00 and \$2.25 per M will have to be realized to offset the 12½% yield tax and still keep the investment out of the red. But this represents forestry at its worst. For a more realistic picture consider the following tabulation.

Cost of Growing Timber for Rotation of 60 Years When Percent of Area Requiring Planting is:				
100%	75%	50%	25%	0%
Per M				
\$1.85	1.48	1.11	0.74	0.37

In contrast to the \$1.85 invested in 60-year-old timber it is noted that the investments are progressively less as a diminishing portion of the total acreage requires planting. In the Grays Harbor area less than one-half of the cut-over lands are poorly stocked or nonstocked. If planting costs are prorated over the entire acreage of a forest property, which is the commonly accepted means of handling this expense, then the cost of growing timber even if considerable planting is required is profitable as shown in the following table.

Net Returns Per Acre* at 60 Years When Percent of Area Requiring Planting is:					
Stumpage Valued At	100%	75%	50%	25%	0%
Per M	Per Acre				
\$1.00	-38.82	-24.09	-9.36	5.37	20.10
1.50	-21.43	- 6.70	8.03	22.76	37.49
2.00	- 4.04	10.69	25.42	40.15	54.88
2.50	13.35	28.08	42.81	57.54	72.27
3.00	30.74	45.47	60.20	74.93	89.66

*Income after annual carrying costs compounded at 3% interest and 12 $\frac{1}{2}$ % yield tax have been deducted (in line with Reforestation Act provisions).

Not reflected in the tables is the important fact that the smaller timber will yield a substantial overrun. This is important for the industrial operator who processes his own logs for it may offset to some extent the higher cost per M where a large amount of planting is required. Neither do the tables reflect the increased rate of growth and intermediate income possible from thinning operations if it should become possible to conduct them. The foregoing discussion demonstrates that one can plant bare land, and if he waits 60 years, realize a profit. But, if a company owns a considerable acreage of timberland at the present time, and sustained yield is a possibility, planting of cutovers in addition to being a sound investment may be regarded as a safety factor guaranteeing continuity of the enterprise.

Social Aspects of Planting

We have considered planting from the investor's point of view, but more important still are the social aspects. If, by planting, the people dependent on a permanent forest economy can be given the security that comes with steady employment the cost, even if it exceeds the value of the product, is more than justified. The average operator, however, no matter how altruistic his motives, just cannot plant idle lands if by doing so he sustains a loss.

The Ownership Pattern

Several industrial landowners have a sufficient acreage of timberland to permit the development of a sustained yield forest economy. Their present holdings may have to be supplemented by acquisition of lands bearing trees of certain age classes and a reduction of the annual cut will have to be made before a continuous cropping can be realized. Encouragement should be given to these companies through improved fire protection, equitable forest taxes and a public appreciation of the social implications of a sustained forest enterprise. County government with public approval should consider means of making it possible for them to consolidate their holdings into logical management units without being impeded by land speculators.

There may be some question as to whether all of the private timber in the Grays Harbor area will find its way into Grays Harbor. Some of it may be manufactured at other points such as Willapa Harbor, Puget Sound or Longview in which case the possible level of industrial activity forecast for Grays Harbor may not materialize.

Much of the acreage in private ownership is held by small owners. This complicates the management picture inasmuch as the necessary controls cannot be imposed to regulate the cutting of timber on these small tracts.

Fortunately, much of the remaining old growth timber is in public ownership. Three public agencies (State of Washington, Forest Service and Indian Service) are committed to a policy of sustained yield, and from these lands approximately 175 million feet can be cut each year. If sustained yield on all ownerships is a serious objective, this volume will help greatly to accomplish it. Otherwise, it will aid to cushion the shock which will inevitably come when the remaining old growth stands in private ownership have finally been cut.

The acreage by ownership shown in the appendix (Page A-1) was taken from the report, "Forest Statistics for Grays Harbor County, Washington," by the Pacific Northwest Forest and Range Experiment Station, July 25, 1938. Only a small area was then shown to be county owned. Since 1938 Grays Harbor County took title to a large acreage of tax delinquent lands, and today the total ownership is approximately 108,000 acres. This land may continue to change hands, and this possibility of shifting ownership is one of the serious deterrents to a planned forest economy. Land and timber might be sold to some entrepreneur who would hold it for a comparatively short time---then sell the timber and let the land again revert to the county. Under these circumstances the timber would likely be cut prior to the time that the new forest has reached its maximum earning power. The public, the county and even the one who recently acquired the timber would have lost by the premature cutting of the stand.

A policy for the management of county lands must be worked out if the county hopes to contribute its share to the solution of the forestry problems in the area.

THE FUTURE OUTLOOK FOR THE FOREST INDUSTRIES ON GRAYS HARBOR

Forecast for the Future if a Forestry Program is Adopted

There is every reason to believe that a forest industry can be sustained in Grays Harbor. It is true that many changes must be made in the manufacture of raw materials and in the utilization of species other than those now in demand, but the job isn't impossible. There is a vast backlog of timber--some 20 billion feet to be more specific--which will assume greater importance when the fast diminishing Douglas-fir is gone. This volume alone will keep the wood industries going for a long time (44 years if the annual cut is reduced to the allowable annual cut under sustained yield). In addition the current annual growth is 174 million feet, and by closer utilization this can be increased to 239 million feet per year. As the remaining stands are cut, and new growth takes the place of the old, the annual increment for the area will be greatly increased. When every acre is fully productive the area can produce between 594 and 943 million feet of timber a year, depending on the degree of utilization. This material, although the same as the current requirements of the forest industries, represents more man days of employment, because the timber on the whole will be smaller, and the smaller the timber, the greater the number of man days of work required in processing a unit of volume.

The area can boast of ideal timber growing conditions. Timber yields are very high and the practice of forestry should be profitable, provided that ample safeguards are taken against fire, overcutting and lack of regeneration.

The large acreage of timberland in public ownership is another reason for being optimistic regarding the future. Public timber is committed to a program of sustained yield and therefore approximately 175 million feet can be cut on public lands within the area each year.

Under a plan for continuous cropping of the forests in the Grays Harbor area the annual cut for the next ten years might be somewhat as follows:

Private Timber	285	Million Feet
State "	75	" "
National Forest Timber	65	" "
Indian "	35	" "
Total	460	" "

Add to this the volume of logs imported from outside sources and the annual volume consumed can be maintained at a level of about 500 to 550 million. But, several drastic changes will have to be brought about.

In the above cutting budget the cut on Indian, state and national forest lands is at the approximate sustained yield level. That on private lands, although substantially less than at present, still represents an overcut. An overcut of this size is justified because any further reduction would seriously affect the communities of Grays Harbor and because it can be made without endangering the prospects of sustained yield at the 460 million foot level.

The distribution by species of the present and proposed cut from the area is as follows:

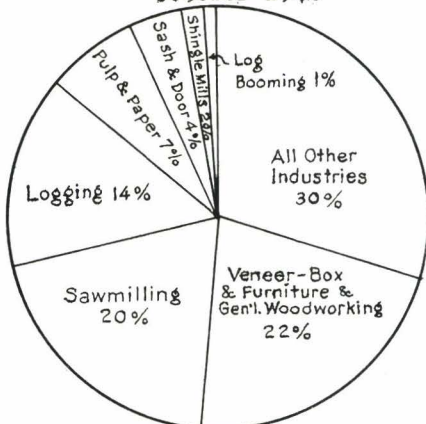
	<u>Proposed Cut</u>			<u>Present Cut</u>		
Douglas-fir	100	Million	B.F.	350	Million	B.F.
Spruce	15	"	"	66	"	"
Hemlock & Silver Fir	315	"	"	89	"	"
Cedar	30	"	"	106	"	"
	<u>460</u>	"	"	<u>611</u>	"	"

This suggests adjustments in the present manufacturing schedules. Whereas, 350 million feet of Douglas-fir have been consumed annually in the past five years, the cut must be reduced to approximately 100 million feet from the area. If fir can be imported at the present rate, approximately 150 million will be available to Grays Harbor. At the same time, the volume of hemlock and silver fir consumed must be greatly increased. If the lumber industry makes the adjustments that are necessary, sustained yield may be visualized. A reduction of about one-third in the annual cut is indicated, but perhaps the most difficult problem is that of converting to species little used at the present time.

Payrolls Under the Proposed Plan

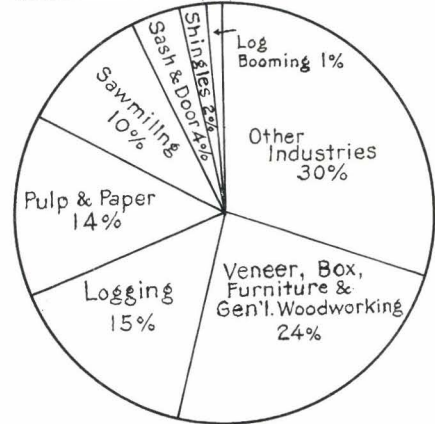
To illustrate the effect that indicated adjustments in the lumber industry might have on future payrolls the following charts are included. The notable changes are: (1) that the pulp capacity is doubled to utilize larger volumes of hemlock; (2) there is a sharp reduction in sawmilling; and (3) an increase in box, furniture and general wood working. Such plywood and lumber products as are produced will make use of hemlock and silver fir. The amount of the annual payroll in each plan would be substantially the same.

CHART VII
Distribution of Workman
Hours - Grays Harbor County
October 1942



Total Men-Hours 1,818,594

CHART VIII
Probable Distribution of
Workman Hours if a Plan for
Continuous Cropping is Adopted



Total Aver. Monthly Men-hours
1,800,000

Steps Needed to Insure Grays Harbor a Sustained Forest Economy

The discussions thus far have presented the facts and a forecast as to what the future may hold if present trends continue. Some suggestions on the kind of program needed to insure Grays Harbor a permanent forest enterprise are discussed below.

1. The Forestry Budget and Ownership Classes

When a person draws upon a savings account faster than the rate at which interest accrues, funds in deposit are due for exhaustion. A forest is like a savings account; the annual growth may be regarded as interest, the forest as the capital in deposit, and the annual cut as the withdrawals. When forest capital is withdrawn in amounts greater than the interest earned, the capital shrinks and in time is completely exhausted. Growth and drain must be brought in balance. This balance is assured insofar as the public timber is concerned but the danger and the difficulty lie in the larger area held by numerous large and small owners and by the county. If all privately owned lands were in a single ownership or if there were but two or three large ownerships intent upon sustained yield management, a balancing of growth and drain would be no less difficult than on the publicly owned lands. But when there are many private owners there are bound to be different reasons for holding land and different management objectives. Some means should be developed whereby these smaller ownerships may become an integral part of the sustained forestry program without necessarily losing their identity.

There are several means of helping to attain a balance of the forestry budget, namely:

- (1) Through acquisition and consolidation of holdings by companies that are in a position to engage in long term management practices.
- (2) Through organization of small owner associations or through affiliation of small owners with industrial tree farms or forest management companies.
- (3) By each individual owner, large or small, cutting his timber according to approved forestry practices whereby the forest growing stock on his land is maintained indefinitely. This would permit the retention of ownership of small tracts, giving the owner of each the opportunity to manage his timber in his own way, providing, however, that the forest growth is maintained.
- (4) Through expansion of public ownership.
- (5) Through creation of county forests and a county forestry organization.

The effect of these measures would be to help balance the cut with the sustained capacity of the forest area.

2. Cooperative Sustained-Yield Units

Although mentioned in connection with balancing the forestry budget, cooperative sustained yield units warrant separate consideration. Their establishment is often desirable where none of the individual owners of adjacent or intermingled timberland have sufficient holdings to permit of sustained-yield operations, but where sustained yield possibilities do exist if individual holdings were consolidated or pooled for management purposes. Such is the case in the Grays Harbor area. The State of Washington is already authorized by legislation to enter into such agreements. The U. S. Forest Service and Indian Service have been granted the same authorization during the preparation of this report, and it would be well for the county along with the state and federal government to so arrange its affairs that it can participate in these arrangements.

3. Keep Grays Harbor Logs at Home

This is much easier said than done for it involves self-imposed restrictions against the sale of logs or stumpage to plants outside the Grays Harbor area. Some shipments are probably inevitable because of the connections between certain timber owners and operators with plants outside the area. However, from the standpoint of Grays Harbor and the sustained production of its plants it can only be said that all log exports represent a direct loss. By virtue of their location, local consumers of logs should have an advantage over distant purchasers, which if reflected in their bidding will help keep logs at home. If additional steps are needed, they will be suggested by further studies which should be conducted by some Grays Harbor group.

4. Increase the Rate of Growth by:

(1) More Intensive Fire Protection

The present growth rate for the working circle as a whole is far from satisfactory. This condition is attributable largely to destructive fires, particularly reburns in logged-off areas. Progress has been made in combating fires but the record thus far indicates that there is still room for improvement. During the period 1937 to 1941 inclusive, approximately 1% of the area was burned over each year, whereas, the commonly accepted standard of protection performance is one-fourth of 1%. In short, fire protection should be four times as effective as it is at present. By far the larger number of fires are man caused, and, therefore, avoidable. Methods by which improved fire protection may be brought about are as follows:

a. By an unrelenting educational campaign which will stress Grays Harbor's stake in keeping its forests green. This could well be carried on jointly by the schools, newspapers, civic organizations, lumber industry and labor.

b. By taking an interest in and keeping abreast of the protection afforded by public and private agencies and by concerted action to rectify financial or other shortcomings.

(2) Closer Woods and Mill Utilization

The net volume realized per acre will fluctuate sharply with the degree of utilization practiced. Under present utilization standards the yields are roughly two-thirds of the volume that might be realized if more complete use were made of the timber (trees to a 12" diameter and logs to an 8" top instead of to the current standard of 16" trees and logs to a 12" top).

The yield of forest products can be further improved if more intensive utilization is made of material now wasted by many of the mills. Waste in the form of sawdust, bark and particularly slabs, if more completely utilized would have the effect of increasing the yields from the timberlands. As a means of increasing yields the following suggestions are offered:

- a. Make periodic analyses of woods operations to find out whether logs which might pay their way are being left in the woods. This is a job for some qualified forest engineer.
- b. Make it economically feasible to utilize smaller sized logs through development of special logging machinery for use in relogging operations, installation of gang saws at the plant or possibly establishment of portable mills in the woods for cleanup purposes.
- c. Prevail on the pulp and paper industry to obtain a greater part of its requirements from sawmill waste.
- d. Create a committee to encourage the establishment of secondary wood-using plants in the Harbor area. Such plants would be those which would consume principally scrap and waste materials in the manufacture of wood products. There are notable examples of this type of enterprise now in operation such as the Posey Manufacturing Company and the Grays Harbor Chair and Manufacturing Company. More are needed.

(3) Improved Methods of Cutting

Every effort should be made to harvest the crop in a manner that will result in the immediate restocking of cut-over lands. Where clear cutting is judged to be the most practicable method, then the pattern of cutting should be so designed as to result in adequate and prompt restocking. This can be accomplished by staggered settings and area selection of comparatively small size. Partial or selective cutting should be considered on those lands where such a method is judged to be possible. Full use should be made of new developments and techniques designed to minimize logging damage.

(4) Rehabilitating Cut-over Lands

The estimated 217,730 acres of nonstocked land within the area constitute a serious threat to a permanent forest economy. The community can ill-afford this much idle land, and it should be brought into production as soon as possible. It is a tremendous job complicated by a diversity of

ownership and other factors but it is conceivable that it can be done in its entirety. The brightest prospect of early and complete accomplishment appears to be in connection with post-war work programs.

Many individual companies throughout the Northwest are now at work on post-war plans for planting, fire protection and stand improvement on their respective holdings. This is true of some in the Grays Harbor area and is commendable, particularly since it is contemplated that proposed work will be privately financed. It follows however that there are limitations to the scope of such work. The most urgent jobs on individual holdings would be done but it would be understandable if they were confined to the most promising sites only, and stopped short of much work that would be in the community interest. Furthermore, it is questionable whether many tracts, particularly the smaller ones, will be provided for at all.

It is somewhat premature to write of the size and scope and financing of emergency post-war public work programs. No one knows these things as yet. But large scale planning is in progress by both public and private agencies, and the likelihood of some kind of a state or federal program to afford employment during the post-war period of readjustment is strong. Ways and means of safeguarding the public investment on private lands resulting from such a program without putting too many objectionable strings on the property should be developed. It should be possible to work out a satisfactory arrangement that would result in a better and more extensive job on private lands that are due for some privately financed improvement, and in addition rehabilitate large areas in less stable ownership that otherwise would not be touched.

If there is to be a state or federal public works program, and if public funds should become available for expenditure on private land there is one job that must be done, and it is none too early now to begin. This is the job of planning--preparation of resource maps to show what the resource is and where it is located; what areas are in need of planting or snag falling or other attention; existing and proposed roads and other protection improvements; priorities; costs; and plan of organization to do the job; and all this integrated with the plans of individual companies. Such a plan will help not only in the procurement of funds but will be of inestimable value in the not inconsiderable job of spending them wisely.

As stated at the outset, a post-war program designed for private land appears to offer the best chance for early and complete rehabilitation. It fits in well with established tree farm programs and the recommendation for a county forestry organization. But in any event, post-war program or not, these two propositions are strong forces for the good of Grays Harbor and should be given every encouragement.

(5) Altering Present Slash Burning Policies

The present state law requiring slash disposal has resulted in reduced fire hazard throughout the Douglas-fir region and made it possible, with strictly limited funds, to maintain a fair measure of forest fire control. But there is increasing evidence to support the view held by many that

these state-wide requirements are not well suited to the peculiar conditions found in parts of the Grays Harbor area. Climatic conditions are different. Slash does not dry out so rapidly nor to the extent that is common farther inland. Hemlock reproduction takes quick possession of the site when logging slash is not burned and a so-called normal hazard is regained much earlier than elsewhere. If the increased hazard during the first few years after logging can be offset with intensified protection, there is every reason to take advantage of the earlier and more complete restocking that will result from a no-burning policy. Just which areas may be so handled, what extra protection is needed and available, and the duration of abnormal hazard are questions that may well be referred to the State Division of Forestry for special study and action.

5. Increase the Man Hours of Employment Per Unit of Raw Materials

When logs are delivered to the mill pond, 7.66 man hours of labor have been expended for every 1,000 board feet of log scale. By the time the sawmill has converted the log to lumber the total man hours of labor consumed has increased to 13.39. But when the lumber has been reprocessed, such as in the making of chairs, sash, doors and wooden ware, the man hours of labor per 1,000 board feet have been increased to as much as 65. By far the greater part of the total volume of wood shipped from this area is in the form of lumber with consequent loss of employment opportunities. If new wood-working plants were established they could sustain the same level of employment even though the number of sawmills and volume of logs are substantially reduced.

6. Establish a System of County Forests

108,000 acres of cut-over land are now owned by the county. Much of it is idle land and unless put under management will create no wealth for many years. Other areas support good stands of reproduction and second growth of various ages that are becoming more and more attractive to private purchasers. Characteristically, county holdings are in scattered tracts.

County authorities have in the past welcomed opportunities to sell these lands both for the purchase price and in order that they be restored to the assessment roll. Ordinarily, these are laudable objectives but one unfortunate result is that the lands, having been purchased for current second growth timber values, are soon stripped of these values and again permitted to go the tax delinquency route. Tax revenue is small and short-lived, and in many instances the young growth is cut just when it is putting on its greatest volume and quality increment. Undoubtedly, if such lands are held by the county and the timber only sold under prescribed practices, the income will equal or exceed outright sale price plus whatever taxes are collected. Furthermore, productiveness of the area and continued income would be assured. This is not to recommend flatly against all sales of land and timber. The county ownership is scattered and needs to be consolidated in management units. Sales and exchanges will be necessary to accomplish this. Some areas may be best suited to incorporation with state or federal management units, others with those of private companies. In any event, the objective should be to get the lands under management and to avoid sales to speculators or purchasers whose only interest is

quick liquidation of values. Lands retained by the county will ultimately be cut by private operators, but there needs to be sale administration and perhaps some discrimination in sales as between operators who have long term management objectives and those who do not. There needs to be a plan and some one to execute it. The opportunity for successful county forestry is there, the job is there, and big enough to tax the resources of the most competent forester who can be secured. It is a professional job, the success of which depends on the formulation and execution of long term policies. It should be made sufficiently attractive to get and hold the type of man required, and he should be removed from the uncertainties and pressures of changing political administrations.

7. Creation of a Permanent Grays Harbor Committee on Forestry

It is apparent from the foregoing that the problems of Grays Harbor can best be solved by real cooperative effort on the part of all individuals, agencies and organizations that have a stake in the forest situation. Any plan of action that does not have the full support of all concerned is handicapped at the start. The forest problems are too important to remain unsolved. Something needs to be done--done now--to formulate plans for a rational use of the timber resource.

Another recommendation, therefore, is to create a permanent committee on forestry. It might well include representatives of forest industry, local civic and labor organizations, the Chambers of Commerce, the county government, the principal industrial forest landowners, the Quinault Indian Reservation, the State Division of Forestry, and the Olympic National Forest.

The functions of the committee would include (1) obtaining commitments from the principal forest landowners as to their forest management policies, (2) formulating both post-war and long range plans for forest rehabilitation and practices in the area, (3) conduct of needed research, especially in the field of local economics, (4) procurement of secondary wood-using industries, (5) handling of public relations campaigns--such as fire prevention, forestry education, etc., (6) instituting action to obtain needed county, state and federal programs to bring about better forestry, (7) serving as an advisory board to the county forester, and (8) in short, effectuating the recommendations in this report that are judged to be feasible and in the public interest.

What Can the Lumber Industry do to Improve the Forest Situation?

The installed mill capacity is about twice the size the timber supply warrants. Industry must cooperate in reducing this capacity and in remodeling out-of-date mills or preferably by replacing them with one or two modern mills which can handle smaller logs efficiently and make full use of the by-products. The utilization of by-products should be in cooperation with secondary wood-using industries. Red alder is increasing in volume and industry should be developed to utilize this species as well as other hardwoods.

The logging industry should make a conscious effort to leave forest lands fully productive. Even where sustained yield is not a possibility and where liquidation is the only course open, operators, in the interest of restocking, should provide staggered settings and avoid large contiguous clear-cut areas. Trees below certain diameters cannot be logged at a profit and if smaller timber can be left undamaged, it will accelerate adequate restocking of the land. The possibilities and advantages of light selective or partial cutting should be fully exploited, for it will result in leaving for future cutting much material which, because of present day economics, cannot be utilized. The industry should join in any campaign that will result in a more widespread use of hemlock, the balsam firs and the knotty second growth of all species. Future cutting will be largely confined to this type of forest and markets for products manufactured from this timber will have to be found.

Any development that will mean an increased rate of consumption of sawlogs should be discouraged. If a new pulp and paper mill were to be established which would admittedly provide more man hours of labor per M feet than a sawmill, and utilize the pulp species, its installation would have to be accompanied by a corresponding decrease in sawmill capacity--and then some--for the forest is already being overcut.

What Can the People and Local Civic Organizations Do?

The people and the local civic organizations should become genuinely interested in the forest problems. They should become thoroughly familiar with the facts and take an active part in planning for the future. They should bring the weight of public opinion directly behind any measure for improvement of the forest situation. The local press can perform a valuable service by revealing the facts and publicizing needed reforms. The public, the civic organizations, and the press should urge better forest practices, sustained yield, better fire protection, rehabilitation of idle lands, a county forest program, tree farms, and needed state and federal aid in bringing about a sustained forest economy. Elementary forestry, particularly as it applied to the Grays Harbor area, might be considered as a topic for the curricula of high schools and the junior college. Some forestry could even be taught in grade schools. Only an enlightened public can fully appreciate the problems and deal intelligently with the forest.

What Can the Counties Do?

Forestry is the essence of county stability. Its practice always entails problems but they are especially numerous and loom largest during the time when forest management policies are being formulated and first put into effect. Always there are uncertainties over taxes--the cost and risk of holding timber, the problems of divided ownership, and the different management objectives of intermingled owners. When a long-established producing center like Grays Harbor resolves to convert to a sustained-yield basis of operation, the problem of curtailing the annual cut is usually present. It is in this instance. At best these are difficult problems, principally of the individual operators, but an enlightened, interested and sympathetic county government can do much to help. Putting its own lands in order is one specific thing it can do, so that they may

make their fullest contribution to the program. In addition, a county forestry organization will constitute a unifying force, and make possible closer liaison between county officials and the developments and problems in the forestry field. Thus, armed with more and better information, and a better understanding of the problems, their field of interest and activity will be broadened and their force for doing good multiplied.

What Can the State Do?

The State's interest in the Grays Harbor area and its problems cannot be minimized. In recognition of the need to stabilize forest industry the State passed legislation authorizing state participation in cooperative sustained yield agreements. It has established what is known as "State Sustained Yield Forest No. 1," in western Jefferson and Clallam Counties. Much of the forest lies within the area and although no formal agreements have yet been made, there are possibilities of cooperative sustained-yield units embracing this and other state, private, and federal land.

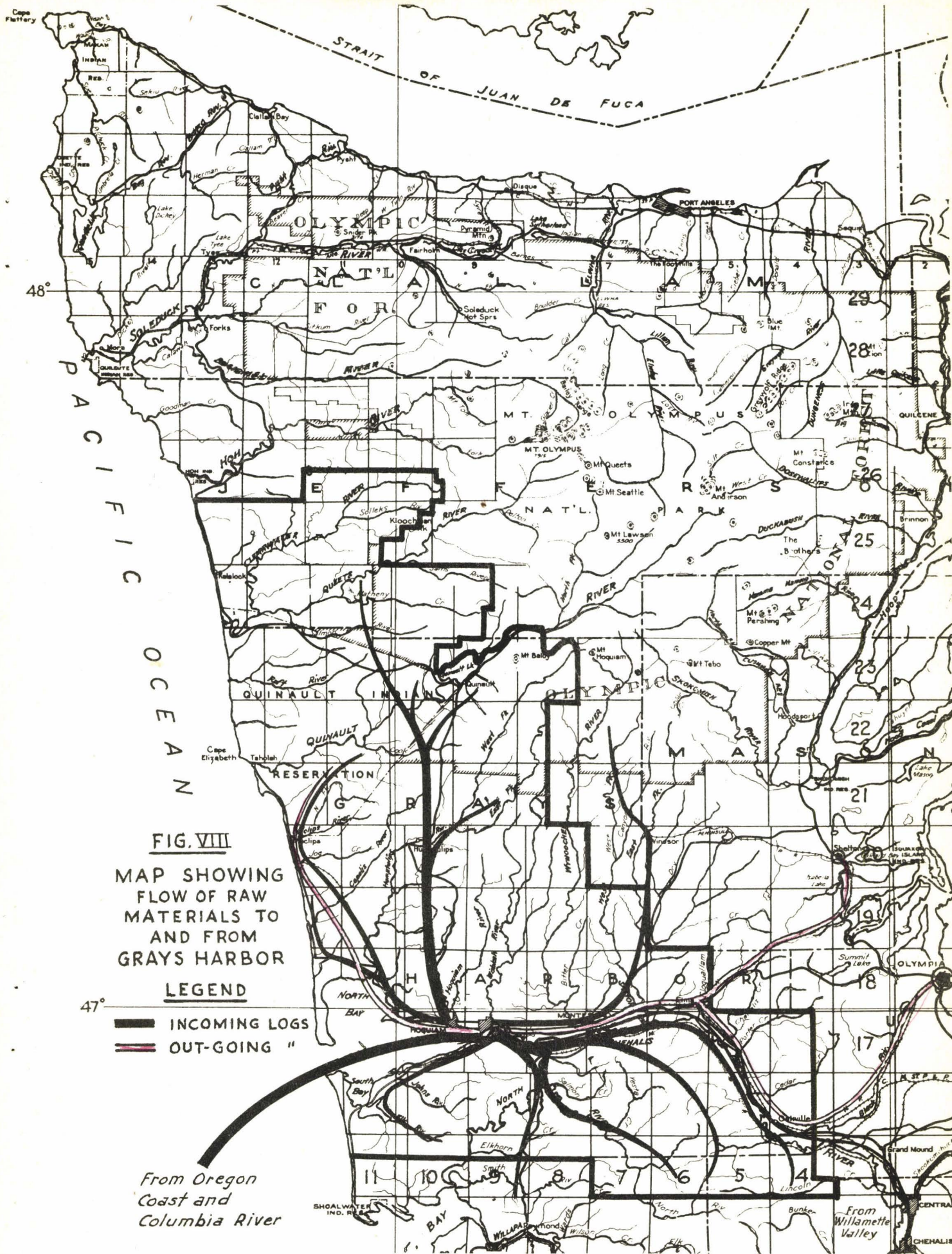
State cooperation in land exchanges to help consolidate state, county, private, and federal holdings offers further possibilities for improvement of the general situation.

There is nothing static about fire control objectives. All uncontrolled fires are intolerable and as one measure of "adequate" protection is reached, and we become more conscious of the importance of forestry and the values at stake, a new and tighter objective will inevitably be set. In the Grays Harbor area about 1% of the area protected was burned during the period 1937 to 1941 inclusive. This is of course better than it has been, but is nearly double the five-year average for the State as a whole, and is four times as great as the one-quarter of 1% standard of protection commonly accepted as being a desirable maximum. There is thus considerable room for protection improvement in the Grays Harbor area and the State of Washington is in a favored position to apply corrective measures.

What Can the Federal Government Do?

Both national forest and Indian lands are under sustained yield management and may be relied upon for a continuing flow of forest products aggregating 90 to 100 million board feet per year. The Forest Service and the Indian Service are now authorized by legislation, passed during preparation of this report, to enter into cooperative sustained yield arrangements and there may develop opportunities to pool these resources with state and private holdings and thus extend the area under long term management.

Forest Service interest in the future of Grays Harbor is evidenced by this study of its resources and problems. It is willing and anxious to maintain close touch, and to respond to the need or requests for further studies or consultation.



A P P E N D I X

Table I

TOTAL LAND AREA GRAYS HARBOR AREA

OWNERSHIP							
	:Private:	State	:County:	Indian:	National: Forest	: Other :	Total
Grays Harbor	:723,060:	56,280:	8,325:	169,694:	78,165:	:	:1,035,705
Jefferson	: 52,668:	173,540:	4,175:	5,465:	52,742:	:	: 288,409
Pacific	: 25,510:	995:	320:	:	:	:	: 26,825
Lewis	: 23,130:	4,935:	:	:	:	:	: 28,065
Total	:824,368:	235,750:	12,820:	175,159:	130,907:	:	:1,379,004

Reserved From Cutting							
Grays Harbor	:	:	:	:	:	:11,820* :	
Jefferson	:	:	465:	:	:	4,125: 250**:	16,660
	:	:	10:	:	:	: 25**:	35
Total	:	:	475:	:	:	4,125:12,095 :	16,695
	:	:	:	:	:	:	:
	:	:	:	:	:	:	:1,395,699

* Municipal

**Other Federal

Table II

TIMBER TYPES IN GRAYS HARBOR AREA

PRODUCTIVE FOREST LAND

	<u>Acreage</u>
<u>Old growth and merchantable second growth</u>	
Douglas-fir	36,710
Sitka spruce	24,007
Western hemlock	287,311
Western redcedar	130,367
Pacific silver-fir	80,414
Hardwoods	30,695
	<u>589,504</u>
<u>Immature</u>	
Douglas-fir	168,515
Sitka spruce	4,450
Western hemlock	233,598
Western redcedar	13,150
Hardwoods	29,540
	<u>449,253</u>
<u>Cutover and not restocked</u>	
Lands cut over prior to 1920 - nonrestocking	38,830
Lands cut over January 1920 to December 1929 - nonrestocking	105,747
Recent cutover - "	72,300
Deforested burns not cut over	855
	<u>217,730</u>
	<u>1,256,487</u>

NONCOMMERCIAL AND NONFOREST TYPES

Lodgepole pine	3,065
Subalpine	5,081
Noncommercial--rocky timbered areas	40,340
Oak - Madrone	310
Agricultural	47,025
Nonforest land	26,696
	<u>122,517</u>
Reserved from cutting	16,695
	<u>139,212</u>
Grand total	<u>1,395,699</u>

Table III

TIMBER VOLUMES - GRAYS HARBOR AREAAvailable for Cutting - January 1, 1942

Species	Volumes M			Scribner		Total
	:Private	: State	: County	: Indian	: National Forest	
Douglas-fir - old growth	440,727	151,143	22	113,181	664,854	1,369,927
" " second growth	567,178	60,240	270	10,738	17,994	656,420
Sitka spruce - large	462,139	176,923	4,319	269,928	151,319	1,064,628
" " small	140,339	8,631	268	42,404	2	191,644
Western hemlock - large	3,345,869	1,723,874	54,765	660,007	2,794,312	8,578,827
" " small	1,210,219	245,645	10,444	75,469	223,054	1,764,831
Western redcedar - live	584,184	606,758	16,256	1,040,521	435,960	2,683,670
" " dead	28,841	10,893	437	366,686	12,818	419,675
White pine	10,365	1,537	-	29,549	3,679	45,130
Silver fir	166,446	1,315,679	6,620	248,243	1,697,955	3,434,443
Hardwoods	69,409	10,660	239	18,398	2,736	101,442
Miscellaneous	434	435	39	4	4,535	5,447
Totals	7,026,150	4,312,418	93,679	2,875,128	6,009,218	20,316,593

Table IV

PRESENT vs. POTENTIAL ANNUAL GROWTHGRAYS HARBOR AREA

		Current Annual Growth		Potential Annual Growth	
		Scribner	Scribner	Scribner	Scribner
	Cubic Feet	16' x 8"	32' x 12"	16' x 8"	32' x 12"
<u>Old Growth and Second Growth - 1,038,757 acres</u>					
Douglas-fir	8,905,902	25,360,100	13,064,600	164,180,000	102,612,500
Spruce	2,075,330	13,034,600	11,329,900	21,165,600	14,228,500
Hemlock	42,995,208	192,238,800	142,098,300	416,727,200	260,454,500
Cedar	1,308,318	6,721,200	4,750,600	114,813,600	71,758,500
Silver fir	-	-	-	40,207,000	24,124,200
Hardwoods	903,525	2,409,400	2,409,400*	12,047,000	12,047,000*
Totals	56,188,283	239,764,100	173,652,800	769,140,400	485,225,200

Lands Recently Cut-over and those not Restocking - 217,730 acres

				174,184,000	108,865,000
Grand Total	56,188,283	239,764,100	173,652,800	943,324,400	594,090,200

*The same volume is shown as under intensive utilization (Scribner Rule 16' logs to 8" top) because hardwoods are not cut in long lengths. This utilization will prevail even though the softwoods may be cut to some other standard.

Table V

TABULATION OF FIRES - GRAYS HARBOR AREA

: Number of Fires by Causes :										
Year:	:	:	:	:	:	:	:	:	:	:Acreage
:Lightning:Incendiary:Campers:Smokers:Slashing:Logging: Burning: Roads: Misc.: Totals: Burned										
1937		8	10	23		4	6	3	14	68 9,317
1938		32	9	72	1	1	6	3	6	130 18,346
1939		11	3	16	1	2	8	3	7	51 2,570
1940	11	30	8	35	1	8	2	1	11	107 4,267
1941	29	9	2	14		3	2	1	4	64 20,958
Totals	40	90	32	160	3	18	24	11	42	420 55,458

Average annual number of fires - 84

Average annual acreage burned - 11,092

Average annual fire loss - 5,546,000 bd.ft. of potential forest growth

Total average annual loss of potential timber volume due to current and past fires which have left the land unproductive - 108,000,000 bd.ft.

Rate Earned by Cut-over Lands Assessed at \$1.35 Per Acre

This analysis is shown by Table VI. It is assumed that cut-over lands will be assessed at \$1.35 per acre which happens to be the average for cut-over lands in Grays Harbor County. Taxes are computed at the present rate of 2.73¢ per dollar of assessed valuation, fire protection is shown to be 4¢ per acre, the amount charged by the Washington Forest Fire Association, and 2¢ per acre is used for land administration costs. These annual carrying charges are computed at 3% compound interest. In this case, it is assumed that the young growth will not be assessed.

The yields per acre are shown at ten-year intervals from 40 to 100 years inclusive. The rate earned is computed for cut-over lands which cost \$1, \$2, and \$3 per acre when the stumpage at the time of harvest is valued at \$1, \$2, and \$3 per M board feet. Under the conditions enumerated above, a prospective tree farmer can see what his investment will earn, depending on how much he has to pay for the land, and if certain stumpage prices prevail at the time of cutting.

Looking at Table VI we see that if the land cost \$2 per acre, and at 60 years of age the stumpage is worth \$1 per M, the land is earning its maximum rate of interest or 4.2%. Timber at 60 years will probably be fairly small on the average, but by keeping it another 20 years, it may increase sufficiently in size to be worth \$2 per M. Then if cut the rate earned will have increased to 5.1%.

No one can predict the trend in stumpage values 40 to 60 years hence, but the tabulation does point out the age at which the timberland is earning its maximum rate of interest and it further shows the effect of price differentials on the length of rotation and the rate earned. It will pay to keep young growth 10 or 20 years longer if by doing so it will increase sufficiently in size and improve in quality to bring a higher stumpage price.

Table VI

RATE EARNED BY LAND GROWING SPRUCE-HEMLOCK ON SITE II

Rate Earned by Cut-over Lands Assessed at \$1.35 per acre.

Scribner
Utilization 32' logs to 12" top

			Gross Income per			Rate of Interest Earned When Land Cost									
: Average* : Yield per : Carrying : Acre when Stumpage :			: Annual : Acre at : Charges : is worth :			: \$1.00 per acre : \$2.00 per acre : \$3.00 per acre									
Age: Growth : Time of : Computed :						and Stumpage is Worth									
When: bd.ft. : Cutting : at 3% : \$1.00 \$2.00 \$3.00 :						\$1.00 \$2.00 \$3.00 : \$1.00 \$2.00 \$3.00 : \$1.00 \$2.00 \$3.00									
Cut: per acre: bd.ft. : per acre: per M :						per M B.M. : per M B.M. : per M B.M.									
: : : \$: \$:						% % % % % % % % % % %									
40	281	11,250	7.87	11.25	22.50	33.75	3.1	7.0	8.4	1.3	5.1	6.6	0.3	4.0	5.5
50	465	23,250	11.28	23.25	46.50	69.75	5.1	7.4	8.4	3.6	5.9	7.0	2.8	5.0	6.2
60	662	39,750	16.31	39.75	79.50	119.25	5.4	7.2	8.0	4.2	5.9	6.8	3.5	5.2	6.0
70	782	54,750	23.06	54.75	109.50	164.25	5.1	6.6	7.4	4.0	5.5	6.2	3.4	4.9	5.7
80	853	68,250	32.13	68.25	136.50	204.75	4.6	6.0	6.6	3.7	5.1	5.7	3.2	4.5	5.2
90	883	79,500	44.33	79.50	159.00	238.50	4.0	5.4	6.0	3.2	4.6	5.2	2.8	4.1	4.7
100	907	90,750	60.73	90.75	181.50	272.25	3.4	4.9	5.5	2.7	4.4	4.8	2.3	3.8	4.3

* 75% of Yield Table

This tabulation is based on the following assumptions:

1. That carrying charges include 4¢ fire protection, 2¢ administrative costs, and 4¢ taxes.
2. That cut-over lands will not be assessed at more than \$1.35 per acre.
3. That second-growth timber will not be assessed.

Rate Earned by Cut-over Lands Assessed at \$1.35 Per Acre and Where
the Young Growth is Periodically Assessed

In the first case it is assumed that the landowner will be fortunate enough to escape paying a tax on the growing timber. In this instance let us assume that the young growth is first appraised at 45 years and assessed at 25¢ per M; then at 65 years the timber is again appraised and assessed at 50¢ per M; and finally at 85 years the timber is assessed at 75¢ per M. Perhaps this is a more realistic approach as it appears inevitable that young growth timber will have to bear its portion of the tax load when the old growth stands disappear. As the present tax base shrinks, new sources of county revenue will have to be found, or the tax rate must be increased on the diminishing base to maintain county income at present levels. This latter course, no doubt, would meet with considerable resistance.

Under the conditions just mentioned we see in Table VII that the rates earned by capital investments in timber-growing lands do not differ greatly if stands of young growth are held no longer than 60 years. After 60 years the carrying charges, compounded at 3%, materially reduce the margin of profit, particularly if \$2.00 or more per acre was paid for the land. When the land cost is \$2.00 or more, the timber has to be grown on longer rotations (70 to 80 years) in hope that higher stumpage values will be realized to permit the investment to earn a satisfactory rate of interest.

Rate Earned by Cut-over Lands Listed Under the Washington Reforestation Law

In this case the rate earned by capital investments in cut-over timberlands is computed on the basis that the land is assessed at \$1.00 per acre, and at the time of harvest a 12 $\frac{1}{2}$ % yield tax will be paid on the value of the products removed.

Table VIII shows the rates earned when lands are listed under the Reforestation Law. If the crop is to be raised on short rotations (40 to 60 years) there is not much to be gained by listing the land under this law. The rates earned are comparable to those where the land is assessed at \$1.35 per acre and the young growth assessed at 45 years of age. The value of the 12 $\frac{1}{2}$ % yield tax on short rotations is slightly more than the capitalized value of the difference in carrying charges between the two alternatives. However, the advantage is definitely in favor of the Reforestation Law in rotations 60 years and older. Greater earnings will be realized however if the land is assessed at \$1.35 per acre and the young growth remains tax free. It would appear that this latter case is highly improbable, as second growth will be taxed when the demand increases for this type of timber.

Looking further into the future, it is quite probable that there will be more of an integrated use made of the timber crop. Grown on longer rotations to yield a good grade of sawlog, the crop will be carefully segregated. Logs bringing a higher stumpage value may be sorted out for a specific purpose--logs of lower value will be diverted to other uses. By sorting for multiple use, the timber owner will realize a maximum profit and the various wood-using plants will be assured of their quota of raw material. The prospective tree farmer should very carefully consider listing his lands under the Reforestation Law. Under this law, the risk of a tax burden is removed, and the owner, if need be, can carry the crop into longer rotations to realize the maximum return on his investment. If the crop is to be grown on short rotations for pulp or cellulose--then there is no advantage in listing the lands under the Reforestation Law. Such listing may even be regarded as a disadvantage, because if the land is later sold the listing constitutes a lien against the land, and the sale can be consummated only after the provisions of the Reforestation Act have been satisfied.

Table VIII

RATE EARNED BY LAND GROWING SPRUCE-HEMLOCK ON SITE II

Rate earned by cut-over lands listed under the Washington Reforestation Law.

Scribner

Utilization 32' Logs to 12" top.

:Average :Yield per:Carrying:Gross Income per Acre :							Rate of Interest Earned When Land Costs								
:Annual :Acre at :Charges:When Stumpage is Worth:							<u>\$1.00 per acre</u>			<u>\$2.00 per acre</u>			<u>\$3.00 per acre</u>		
Age :Growth	:Time of	:Computed:	:	:	:	:	and Stumpage is Worth								
When: bd.ft.	:Cutting	: at 3%	: \$1.00	\$2.00	\$3.00:	\$1.00	\$2.00	\$3.00	\$1.00	\$2.00	\$3.00	\$1.00	\$2.00	\$3.00	
Cut :per acre:	bd.ft.	:per acre:	:	Per M	:	:	per M B.M.	:	per M B.M.	:	per M B.M.	:	per M B.M.	:	
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
40	281	11,250	7.09	9.84	19.59	29.53	2.6	6.6	8.0	0.8	4.7	6.2	0.2	3.6	5.1
50	465	23,250	10.15	20.34	40.69	61.03	4.8	7.0	8.2	3.3	5.6	6.6	2.5	4.8	5.8
60	662	39,750	14.68	34.78	69.56	104.34	5.1	6.9	7.8	4.0	5.7	6.5	3.2	5.0	5.8
70	782	54,750	20.75	47.90	95.81	143.72	4.8	6.4	7.1	3.8	5.3	6.0	3.2	4.7	5.4
80	853	68,250	28.92	59.72	119.44	179.16	4.4	5.8	6.5	3.5	4.9	5.5	3.0	4.3	5.0
90	883	79,500	39.90	69.56	139.12	208.69	3.8	5.2	5.9	3.0	4.4	5.1	2.6	4.0	4.6
100	907	90,750	54.66	79.41	158.81	238.22	3.3	4.8	5.4	2.5	4.0	4.6	2.1	3.6	4.2

This tabulation is based on the following assumptions:

1. That the lands will be classified as reforestation lands, and will be assessed at \$1.00 per acre.
2. Carrying charges include 3¢ taxes, 2¢ administrative costs, 4¢ fire protection.
3. That a yield tax of 12-1/2% is paid at the time the crop is harvested.